

Day 2 - Evaluating Expressions

Order of Operations is the order to which you perform operations in a math problem. Order of operations is CRUCIAL for all types of Algebra 1 topics – linear equations, quadratic equations, etc.

- Order of Operations**

 1. Parenthesis or Grouping Symbols
 2. Exponents
 3. Multiplication or Division – whichever comes first
 4. Addition or Subtraction – whichever comes first

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E
M
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()
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x
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+
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Order of Operations (Parenthesis)

• Things to Consider

- Brackets can be used as parenthesis: $3 \times [7 + 1]$
- You ALWAYS work from inside parenthesis to outside parenthesis: $3 + [4 - (2 \times 1)]$

a. $7 + (8 \times 4)$
 $7 + 32$
 39

b. $3(20 - 14) + (9 \cdot 1)$
 $3(6) + (9)$
 $18 + 9$
 27

c. $[(5 + 2) - 2] \times 6$
 $[7 - 2] \times 6$
 5×6
 30

Order of Operations - Exponents

$1 \ 2 \rightarrow \ / \ x^2 \ \rightarrow$

• Things to Consider

- Any integer that has 0 as an exponent is always equal to 1: $5^0 = 1$
- Any integer that has 1 as an exponent is always equal to itself: $7^1 = 7$
- The exponent tell you how many times you are multiplying a number times itself: $4^3 = 4 \times 4 \times 4$

$x^5 = x \cdot x \cdot x \cdot x \cdot x$

$x^0 = 1$
 $1243^0 = 1$

$50000^1 = 50000$

a. $4(1 + 3)^2$
 $4(4)^2$
 $4 \cdot 16$
 64

b. $70 - 3 - (4 \div 2)^2$
 $70 - 3 - 2^2$
 $70 - 3 - 4$
 $67 - 4$
 63

c. $(5 + 2)^2 - 2 + [4^2 + 3]$
 $7^2 - 2 + [4^2 + 3]$
 $7^2 - 2 + [16 + 3]$
 $7^2 - 2 + 19$
 $49 - 2 + 19$
 $47 + 19$
 66

Order of Operations – Multiplication & Division

• Things to Consider

- You multiply or divide depending on whichever operation comes first as you work from left to right.

a. $7 \div 1 \times 3$
 7×3
 21

b. $2^2 \cdot (4 \times 3)$
 $2 \cdot (12)$
 $4 \cdot 12$
 48

c. $6 \div 2[1 + (3 \times 2)]$
 $6 \div 2[1 + 6]$
 $6 \div 2(7)$
 $3(7)$
 21

Order of Operations – Multiplication & Division Add + Sub +/-

• Things to Consider

- You add or subtract depending on whichever operation comes first as you work from left to right.

a. $3 \times 5 - 8 \div 4 + 6$
 $15 - 8 \div 4 + 6$
 $15 - 2 + 6$
 $13 + 6$
 19

b. $6 + 2(4 + 1)^2$

c. $3^2 \div 3 + 4 \times 4 - 2$

Order of Operations – Fractions

• Things to Consider

- Simplify everything in the numerator using order of operations
- Simplify everything in the denominator using order of operations
- Divide to find answer

a. $\frac{(2+3)^2 + 3}{2+15 \div 3}$
 $(2+3)^2 + 3$
 $(5)^2 + 3$
 $25 + 3$
 28
 $2 + 15 \div 3$
 $2 + 5$
 7
 $\frac{28}{7} = 4$

b. $\frac{(3 \cdot 3) - 4}{12 \div 4 + 1^4}$
 $(3 \cdot 3) - 4$
 $9 - 4$
 5

$1 \cdot 1 \cdot 1 \cdot 1 = 1$
 $12 \div 4 + 1^4$
 $12 \div 4 + 1$
 $3 + 1$
 4

$\frac{5}{4} = 1.25$

5

Evaluating Expressions

When you **evaluate** an expression, you are replacing the variable with what the variable equals:

Evaluate $4x - 5$ when $x = 6$

$$4(6) - 5$$

$$4(6) - 5$$

$$\begin{array}{r} 24 - 5 \\ \hline 19 \end{array}$$

Practice: Evaluate the following expressions if $m = 7$, $r = 8$, and $t = -2$.

a. $5m - 6$

$$5(7) - 6$$

$$35 - 6$$

$$\boxed{29}$$

b. $\frac{r}{t}$

$$\frac{8}{-2}$$

$$\boxed{-4}$$

c. $3m - 5t$

$$3(7) - 5(-2)$$

$$21 + 10$$

$$\boxed{31}$$

d. $t^2 - 4r$

$$(-2)^2 - 4(8)$$

$$4 - 32$$

$$\boxed{-28}$$

Application: Answer the following questions:

1. You earn $15n$ dollars for mowing n lawns. $15n$

a. How much do you earn for mowing 1 lawn?

$$15(1) = \$15$$

b. How much do you earn for mowing 9 lawns?

$$15(9) = \$135$$

KHD * d cm

2. After m months, the length of a fingernail is $10 + 3m$ millimeters. $10 + 3m$ (mm)

a. How long is the fingernail, in centimeters, after 8 months?

$$10 + 3(8)$$

$$10 + 24 = 34 \text{ mm} = 3.4 \text{ cm}$$

b. How long is the fingernail after three years?

$$10 + 3m$$

$$10 + 3(36)$$

$$10 + 108 = \boxed{118 \text{ mm}}$$

$$\frac{3 \text{ yr.}}{1} \cdot \frac{12 \text{ mo}}{1 \text{ yr}} =$$

$$36 \text{ mo.}$$